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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/563,177	04/25/2006	Sebastian Kozerke	7665-0003WOUS	3772

35301 7590 11/30/2006

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EXAMINER	
VARGAS, DIXOMARA	

ART UNIT	PAPER NUMBER
2859	

DATE MAILED: 11/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/563,177	KOZERKE ET AL.	
	Examiner	Art Unit	
	Dixomara Vargas	2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-9 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-9 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 30 December 2005 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the Search Report is not considered to be an information disclosure statement (IDS) complying with 37 CFR 1.98. 37 CFR 1.98(a)(2) requires a legible copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed; (3) for each cited pending U.S. application, the application specification including claims, and any drawing of the application, or that portion of the application which caused it to be listed including any claims directed to that portion, unless the cited pending U.S. application is stored in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which caused it to be listed. In addition, each IDS must include a list of all patents, publications, applications, or other information submitted for consideration by the Office (see 37 CFR 1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on a separate paper." Therefore, the references cited in the Search Report have not been considered. Applicant is advised that the date of submission of any item of information or any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the IDS, including all "statement" requirements of 37 CFR 1.97(e). See MPEP § 609.05(a).

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification fails to disclose or fairly suggest the step of alternating the sweep direction in the sampling k space.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-9 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea) and is not directed to a practical application of such judicial exception (e.g., because the claim does not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result). The language in the claim suggests only a combination of instructions without reciting a structure associated to the procedure and lacks a tangible result and the end of the procedure.

5. Claim 9 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claim 9 is merely directed towards a set of instructions capable of being executed by a computer without the computer-readable medium. A computer program's functionality is considered a nonstatutory functional descriptive material because they are not capable of causing functional change in the computer. Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed

aspects of the invention which permit the data structure's functionality to be realized. The descriptions or expressions of the programs are not physical "things." They are neither computer components nor statutory processes, as they are not "acts" being performed. Such claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized. See MPEP 2106.01 [R-5]

Claim Rejections - 35 USC § 103

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-5, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao et al. (US 7,005,853 B2) in view of Mock (US 6,529,001 B2).

With respect to claim 1, Tsao discloses a magnetic resonance imaging method to produce successive magnetic resonance images wherein: a series of successive magnetic resonance signals is obtained by steady-state free precession imaging (Column 4, lines 11-12), successive sets of magnetic resonance signals in the series are acquired by successively scanning respective sets of points in k-space in an undersampled fashion (Columns 2-3, lines 61-67 and 1-9 respectively; Abstract), the magnetic resonance signals are acquired, and successive magnetic resonance images are reconstructed from the successive sets of magnetic resonance signals using a suitable reconstruction method (Column 3, lines 15-22).

Furthermore, Tsao discloses the claimed invention as stated above except for the step wherein the magnetic resonance signals are acquired in conjunction with an eddy-current reduction technique. However, Mock discloses the magnetic resonance signals are acquired in conjunction with an eddy-current reduction technique (Column 6, lines 8-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to acquired the magnetic resonance signals in conjunction with an eddy-current reduction technique as taught by Mock with Tsao's magnetic resonance imaging method to produce successive magnetic resonance images for the purpose of correcting for phase error more accurately in real time as taught by Mock (Column 6, lines 22-29).

9. With respect to claim 2, Tsao discloses the claimed invention as stated above in paragraph 9, except for the step wherein the eddy-current reduction technique employs alternating sweep directions in sampling k-space. However, Mock discloses the step wherein the eddy-current reduction technique employs alternating sweep directions in sampling k-space (Column 6, lines 8-55). Therefore, it would have been obvious to one of ordinary skill in the art

at the time the invention was made to perform the step wherein the eddy-current reduction technique employs alternating sweep directions in sampling k-space as taught by Mock with Tsao's magnetic resonance imaging method to produce successive magnetic resonance images for the purpose of correcting for phase error more accurately in real time as taught by Mock (Column 6, lines 22-29).

10. With respect to claim 3, Tsao discloses the step wherein successive sets of magnetic resonance signals are acquired by successively scanning respective sets of points in k-space in an undersampled fashion such that the ensemble of successive sets cover the entire portion of k-space at full sampling density (Columns 2-3, lines 61-67 and 1-9 respectively; Abstract), successive updates of a training set of magnetic resonance signals are obtained from the magnetic resonance signals, either in the same scan or in a separate scan, by further acquisition of the central portion of k-space at full sampling density, successive updates of a training set of magnetic resonance signals are obtained from the magnetic resonance signals, either in the same scan or in a separate scan, by further acquisition of the central portion of k-space at full sampling density or with slight undersampling if multiple receiver antennae are used, the undersampled sets of magnetic resonance signals are successively updated by further undersampled scans of the entire k-space (Column 2, lines 14-39); and a distribution of likelihood of changes in the successive magnetic resonance images is identified from the static reference image and/or the training data, in the space spanned by geometrical space alone or by geometrical space and temporal frequency (Column 2, lines 14-39), successive magnetic resonance images are reconstructed from the respective sets of undersampled magnetic resonance signals (Column 3,

lines 15-22) on the basis of the identified distribution of likelihood of changes (Column 2, lines 14-39).

Note: Claim 3 has optional limitations that have not been given patentable weight since said limitations are not positively recited. Furthermore, since said limitations are recited to be optional, they are considered as not being critical for the invention. The optional steps are the following: a baseline image is optionally reconstructed from the training data and/or undersampled data, or from data acquired separately during time periods with little or no motion, and optionally the baseline image, and the magnetic resonance signals are optionally acquired by way of a receiver antennae system having a spatial sensitivity profile, and the successive magnetic resonance images are reconstructed from the respective sets of undersampled magnetic resonance signals on the additional and optional basis of the sensitivity profile of the receiver antennae.

11. With respect to claim 4, Tsao discloses wherein the magnetic resonance signals are acquired by way of a receiver antennae system having a spatial sensitivity profile, and successive magnetic resonance images are reconstructed from the respective sets of undersampled magnetic resonance signals on the basis of the sensitivity profile of the receiver antennae (Abstract).

12. With respect to claim 5, Tsao discloses the step wherein successive magnetic resonance images are reconstructed from the respective sets of undersampled magnetic resonance signals on the basis of a reduced field of view, where changes in image contents are assumed to take place (Column 5, lines 25-43).

13. With respect to claim 8, Tsao discloses a magnetic resonance imaging method comprising the steps of obtaining a series of subsequent magnetic resonance signals by steady-state free precession imaging (Column 4, lines 11-12); and acquiring a set of magnetic resonance signals in an undersampled fashion (Columns 2-3, lines 61-67 and 1-9 respectively; Abstract).

Furthermore, Tsao discloses the claimed invention as stated above except for the step wherein the magnetic resonance signals are acquired in conjunction with an eddy-current reduction technique such as by alternating the sweep directions of sampling in k-space. However, Mock discloses the magnetic resonance signals are acquired in conjunction with an eddy-current reduction technique such as by alternating the sweep directions of sampling in k-space (Column 6, lines 8-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to acquired the magnetic resonance signals in conjunction with an eddy-current reduction technique as taught by Mock with Tsao's magnetic resonance imaging method to produce successive magnetic resonance images for the purpose of correcting for phase error more accurately in real time as taught by Mock (Column 6, lines 22-29).

Note: Claim 8 has optional limitations that have not been given patentable weight since said limitations are not positively recited. Furthermore, since said limitations are recited to be optional, they are considered as not being critical for the invention. The optional steps are the following: optionally acquiring the magnetic resonance signals by way of a receiver antennae system having a spatial sensitivity profile, optionally acquiring an additional training set of magnetic resonance signals, optionally reconstructing a baseline image from the training data and/or undersampled data, or from data acquired separately during time periods with little or no

motion, optionally identifying a distribution of likelihood of changes in the successive magnetic resonance images from the baseline image and/or the training data, in the space spanned by geometrical space alone or by geometrical space and temporal frequency, optionally reconstructing the successive magnetic resonance images from the respective sets of magnetic resonance signals of the dynamic series on the basis of: the identified distribution of likelihood of changes the baseline image, the sensitivity profile of the receiver antennae, and/or a reduced field of view where changes in image contents are assumed to take place.

14. With respect to claim 9, Tsao discloses a computer program product comprising instructions to obtain a series of subsequent magnetic resonance signals by steady-state free precession imaging (Column 4, lines 11-12), acquire a set of magnetic resonance signals in an undersampled fashion (Columns 2-3, lines 61-67 and 1-9 respectively; Abstract).

Furthermore, Tsao discloses the claimed invention as stated above except for the step wherein the magnetic resonance signals are acquired in conjunction with an eddy-current reduction technique such as by alternating the sweep directions of sampling in k-space. However, Mock discloses the magnetic resonance signals are acquired in conjunction with an eddy-current reduction technique such as by alternating the sweep directions of sampling in k-space (Column 6, lines 8-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to acquired the magnetic resonance signals in conjunction with an eddy-current reduction technique as taught by Mock with Tsao's magnetic resonance imaging method to produce successive magnetic resonance images for the purpose of correcting for phase error more accurately in real time as taught by Mock (Column 6, lines 22-29).

Note: Claim 9 has optional limitations that have not been given patentable weight since said limitations are not positively recited. Furthermore, since said limitations are recited to be optional, they are considered as not being critical for the invention. The optional steps are the following: optionally acquire the magnetic resonance signals by way of a receiver antennae system having a spatial sensitivity profile, optionally acquire an additional training set of magnetic resonance signals, optionally reconstruct a baseline image from the training data and/or undersampled data, or from data acquired separately during time periods with little or no motion, optionally identify a distribution of likelihood of changes in the successive magnetic resonance images from the baseline image and or the training data, in the space spanned by geometrical space alone or by geometrical space and temporal frequency, optionally reconstruct the successive magnetic resonance images from the respective sets of magnetic resonance signals of the dynamic series on the basis of: the identified distribution of likelihood of changes the baseline image, the sensitivity profile of the receiver antennae, and/or a reduced field of view where changes in image contents are assumed to take place.

15. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao et al. (US 7,005,853 B2) and Mock (US 6,529,001 B2) in view of Anand et al. (US 6,411,089 B1).

With respect to claim 6, Tsao and Mock disclose the claim invention as stated above in paragraph 11, except for the step wherein an elliptical k-space shutter is applied. However, Anand discloses the step of applying an elliptical k-space shutter (as seen on Figures 2 and 5). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply an elliptical k-space shutter as taught by Anand with Tsao and Mock's

magnetic resonance imaging method to produce successive magnetic resonance images for the purpose of sampling the K space data in a known manner for at least to data sets, for example, the central region and the peripheral region and create a phase correction on the desired region from one of the regions as taught by Anand (Column 2, lines 16-34).

16. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsao et al. (US 7,005,853 B2) and Mock (US 6,529,001 B2) in view of Dale et al. (US 6,771,068 B2).

With respect to claim 7, Tsao and Mock disclose the claim invention as stated above in paragraph 11, except for the step wherein navigator-based volume tracking is applied. However, Dale discloses the step wherein navigator-based volume tracking is applied (Column 2, lines 1-3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a navigator-based volume tracking as taught by Dale with Tsao and Mock's magnetic resonance imaging method to produce successive magnetic resonance images for the purpose of correcting the motion of the object being examined after the error has being detected as taught by Dale (Column 2, lines 1-3).

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional prior art cited in the PTO 892 discloses MR methods with undersampling procedures and eddy current compensation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dixomara Vargas whose telephone number is (571) 272-2252. The examiner can normally be reached on Monday to Thursday from 8:00 am. to 4:30 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on (571) 272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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November 21, 2006

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